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Subject: 2014 Lake Level Report For your Review and Comment - By February 13
Date: Monday, January 12, 2015 2:37:50 PM
Attachments: [Lake Chelan Annual Lake Level Report draft final 2014.docx](#)

PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
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Re: Lake Chelan Hydroelectric Project No. 637
License Article 405 – 2014 Annual Lake Level Report

It is that time of year again! Please find the 2014 Lake Chelan Annual Lake Level Report attached for your review and comment.

We plan to finalize and submit the 2014 Lake Level Report to the Federal Energy Regulatory Commission about the end of February. For your information, we've provided (below) a summary and links to this License requirement.

Please submit your comments to me at jeff.osborn@chelanpud.org on or before the end of the day on **February 13, 2015**. All received comments and Chelan PUD responses will be included in the final report submitted to FERC.

If you have any questions, please feel free to contact me at 509-661-4176. Thank you, very much, for taking time out of your busy schedules to review the report.

Jeff

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FERC License Order, November 6, 2006 :

<http://www.chelanpud.org/documents/9009.pdf>

(b) a provision to file with the Commission within one year of the issuance date of the license, and annually thereafter, a report comparing monthly actual and target lake levels; and runoff volume forecasts and other factors influencing achievement of targeted lake levels; and (c) an implementation schedule. The licensee shall prepare the plan after consultation with **the Washington Department of Ecology; NOAA National Marine Fisheries Service (NMFS), U.S. Geological Survey (USGS), U.S. Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, Washington State Parks and Recreation Commission, Washington Interagency Committee for**

Outdoor Recreation, Confederated Tribes of the Colville Reservation, the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, City of Chelan, Lake Chelan Sportsman's Association, Manson Parks and Recreation Department, Lake Chelan Recreation Association, and American Whitewater.

Order Modifying and Approving Operations Compliance and Monitoring Plan, Article 405, November 30, 2007:

http://www.chelanpud.org/departments/licensingCompliance/lc_implementation/ResourceDocuments/9494_1.pdf

(C) The licensee shall file annually with the Commission by February 28, beginning in 2009, their Annual Lake Level Report. The licensee shall allow the resource agencies, Tribes and non-governmental organizations specified under Article 405, 30 days to provide comments and/or recommendations on their report before filing with the Commission.

LAKE CHELAN ANNUAL LAKE LEVEL REPORT 2014

LICENSE ARTICLE 405

Draft

**LAKE CHELAN HYDROELECTRIC PROJECT
FERC Project No. 637**

February 28, 2015



**Public Utility District No. 1 of Chelan County
Wenatchee, Washington**

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SECTION 1: EXECUTIVE SUMMARY

The Public Utility District No. 1 of Chelan County, Washington (Chelan PUD) received a new license (License)¹ from the Federal Energy Regulatory Commission (FERC) on November 6, 2006, authorizing Chelan PUD to operate the Lake Chelan Project (Project) for a period of 50 years. License Article 405 requires Chelan PUD to annually file with FERC a report comparing monthly actual and target lake levels, runoff volume forecasts and other factors influencing achievement of target lake levels.

During 2014 Chelan PUD managed lake levels as runoff forecasts evolved through winter and spring. Runoff forecasts for the April 1 to July 31 time period were for 63% of average runoff on February 1, 85% of average runoff on March 1, and 105% of average runoff on April 1. Actual runoff for the April 1 – July 31 time period was 100% of average. Lake levels were successfully managed, as defined in Chapter 8 of the Lake Chelan Comprehensive Plan,² to meet all operating objectives and lake level targets for the year 2014.

The table below compares monthly actual and lake level targets May through October 2014. Chelan PUD manages lake levels following an annual draft and refill cycle, generally beginning in August, which starts to release water from Lake Chelan to meet operating objectives and for power generation from September through March, then refills Lake Chelan from April through July.

Table 1: Comparison of Actual and Target Lake Levels

Date	License Target Lake Level (feet)	2014 Actual Lake Level (end of day)* (feet)	Difference between Actual and Target Lake Level (feet)
May 1, 2014	1,087.6	1,088.2	0.6
June 1, 2014	1,094.0	1,095.0	1.0
July 1, 2014	1,098.0	1,099.1	1.1
August 1, 2014	1,099.0	1,099.5	0.5
September 7, 2014	1,098.7	1,099.0	0.3
October 1, 2014	1,097.2	1,097.4	0.2

* USGS Gage #12452000 Lake Chelan at Chelan

¹ Federal Energy Regulatory Commission Order on Offer of Settlement and Issuing New License and Order on Rehearing for the Lake Chelan Hydroelectric Project No. 637 were issued November 6, 2006, and April 19, 2007, respectively, to the Public Utility District No. 1 of Chelan County.

² Final Lake Chelan Comprehensive Settlement Agreement for the Lake Chelan Project No. 637, dated October 8, 2003.

SECTION 2: INTRODUCTION

The Public Utility District No. 1 of Chelan County, Washington (Chelan PUD) received a new license (License)³ from the Federal Energy Regulatory Commission (FERC) on November 6, 2006, authorizing Chelan PUD to operate the Lake Chelan Project (Project) for a period of 50 years. The License sets a minimum lake level of 1,079 feet and a maximum lake level at 1,100 feet. Chelan PUD manages lake levels within the minimum and maximum elevations according to license operating objectives and for power generation.

The License establishes monthly target lake levels for the period from May 1 through October 1 that Chelan PUD will try to attain consistent with the license operating objectives for flood control, protection of fish resources, recreation, and prevention of erosion. Chelan PUD monitors snowpack in the Lake Chelan runoff basin and predicts snowmelt runoff volume from December through August. Chelan PUD manages power generation and spill to reach lake level targets by using runoff volume and precipitation forecasts, past experience with runoff timing and actual lake levels.

License Article 405 requires Chelan PUD to annually file with FERC a report comparing monthly actual and target lake levels, runoff volume forecasts and other factors influencing achievement of lake level targets. This Lake Level Report documents decisions and other information regarding achievement of monthly target lake levels beginning May 2014 through October 2014.

Chelan PUD is using a hydropower system simulation model (CHEOPS) developed specifically to assist with lake level management decisions. The CHEOPS computer model uses historical information, a target curve, and operational constraints to provide a predictive tool for making operational decisions. Historical information includes a data set of Lake Chelan hydrologic variables which Chelan PUD began collecting in 1952. A target curve is a collection of elevations with corresponding dates which are used to guide the computer model and subsequent operating decisions. Operational constraints include minimum and maximum generation limits and spill requirements or limitations. The use of a target curve, in conjunction with professional experience and actual hydrologic behavior of the lake environment, provides the best available basis for balancing license objectives and the likelihood of being within reasonable predictive probability of meeting monthly lake level targets.⁴ In some years, late runoff may affect the ability to meet lake level targets, and, therefore, lake level targets would be met as soon as practicable.

³ Federal Energy Regulatory Commission Order on Offer of Settlement and Issuing New License and Order on Rehearing for the Lake Chelan Hydroelectric Project No. 637 were issued November 6, 2006, and April 19, 2007, respectively, to the Public Utility District No. 1 of Chelan County.

⁴ Section 3.1 of Chapter 8, Final Lake Chelan Comprehensive Settlement Agreement for the Lake Chelan Project No. 637, dated October 8, 2003.

SECTION 3: COMPARISON OF ACTUAL AND TARGET LAKE LEVELS

The table below compares monthly actual and target lake levels May through October 2014. Lake levels are recorded at the end of the day, 2400 hours. Chelan PUD manages lake levels following an annual draft and refill cycle, generally beginning in August, which starts to release water from Lake Chelan to meet operating objectives, lake level targets, and for power generation from September through March, then refills Lake Chelan from April through July. Lake levels were successfully managed using generation and spill as defined in Chapter 8 of the Lake Chelan Comprehensive Plan.

Table 2: Comparison of Actual and Target Lake Levels

Date	License Target Lake Level (feet)	2014 Actual Lake Level (end of day)* (feet)	Difference between Actual and Target Lake Level (feet)
May 1, 2014	1,087.6	1,088.2	0.6
June 1, 2014	1,094.0	1,095.0	1.0
July 1, 2014	1,098.0	1,099.1	1.1
August 1, 2014	1,099.0	1,099.5	0.5
September 7, 2014	1,098.7	1,099.0	0.3
October 1, 2014	1,097.2	1,097.4	0.2

* USGS Gage #12452000 Lake Chelan at Chelan

SECTION 4: ACTUAL AND FORECASTED RUNOFF

April 1 through July 31, 2014, runoff forecasts for the Chelan Basin were produced on February 1, March 1, and April 1 of 2014. The runoff forecast on February 1 of 63% of average was very low, the runoff forecast on March 1 improved considerably to 85% of average, and the runoff forecast on April 1 showed additional improvement to 105% of average. Runoff volume forecasts and lake level are summarized below in Table 3.

Table 3: Runoff Volume Forecasts for April 1 – July 31, 2014

Date	Forecasted Percent of Average Runoff	Forecasted Runoff Volume (SFD)
February 1	63%	330,813
March 1	85%	446,335
April 1	105%	551,355

Actual runoff for April 1 through July 31 was 100% of average, producing 526,392 second-foot-days (SFD)⁵ of water.

⁵ The volume of water represented by a flow of 1 cubic foot per second for 24 hours.

SECTION 5: DECISIONS RELATED TO LAKE LEVEL

Chelan PUD manages Lake Chelan lake levels with the intent of meeting operating objectives, target lake levels (to the extent consistent with the objectives), and providing efficient operation of Chelan PUD generating resources. All operating objectives and monthly target lake levels were achieved in 2014.

Operations during the fall of 2013 are summarized in this paragraph, as these operations set up operations for 2014. Generation from October through mid-December 2013 was scheduled at near maximum to provide reservoir draft, to create room for spring runoff, to provide flood control, and to generate electricity. Initial snowpack accumulation in November and December 2013 was less than average. Generation was reduced the second half of December 2013 to conserve water to meet tailrace security flows for Chinook salmon later in the winter.

The lake level on January 1, 2014, was 1,089.2 feet. Generation was scheduled at less than maximum month average capacity during January, February and March, in order to continue to draft the reservoir, while still retaining enough water to maintain tailrace security flows through March.

The reservoir reached a low point of 1,085.8 feet on Mar 7, 2014, and the reservoir began to steadily refill in early April. Generation was limited to either one or no available units from March 17 to May 16 due to maintenance activities. Generation was scheduled at maximum capacity beginning May 17 (as soon as both generating units became available) and continued through until the end of July until inflows dropped below turbine capacity. Refill timing was almost average, with 79% of the April 1 to July 31 runoff occurring by July 1 (80% is considered average).

Spill was increased from approximately 85 cfs to just over 200 cfs beginning May 14, and at least 200 cfs spill was provided from then through July 15 to meet fish flow objectives in Reaches 1-3 of the Chelan River. Spill was increased for headwater control on May 23, and continued through July 26, to manage the refill rate of Lake Chelan in order to meet license objectives and lake level targets.

One of the priority operating objectives is to reduce high flows in the Chelan River (below 6,000 cfs)⁶ to protect fish habitat. Successful lake level management resulted in a 2014 peak hourly flow of 5,660 cfs in the Chelan River on July 23, and a maximum daily average flow of 4,322 cfs on July 15. Successful lake level management also provided adequate flood control and resulted in meeting minimum required flows in the Chelan River, both priority operating objectives.

Inflows generally declined in early July through August, with some lake storage drafted for generation toward the end of July. A maximum end-of-hour lake level of 1,100.0 feet was achieved on July 13, and a maximum daily average lake level of 1,098.98 feet was achieved on

⁶ Section 3.1 of Chapter 8, Final Lake Chelan Comprehensive Settlement Agreement for the Lake Chelan Project No. 637, dated October 8, 2003.

July 14. The reservoir was gradually drafted through August and early September and was maintained above the September 7 lake level target. After September 7, the reservoir was gradually drafted to just above the October 1 lake level target. Reservoir draft continued through October, November and December of 2014 to provide reservoir draft, to create room for spring runoff, to provide flood control, and to generate electricity.

SECTION 6: CONSULTATION

As required in Article 405, Chelan PUD distributed a draft copy of this report on Jan 12 to Feb 13, 2015 (30 days) to the following resource agencies, Tribes and non-governmental organizations for review and comment:

Agency	Contact
Washington Department of Ecology	Chris Coffin, Charlie McKinney, Jim Pacheco
U.S. Geological Survey (USGS)	Nick Elwell
NOAA National Marine Fisheries Service	Justin Yeager
U.S. National Park Service	Annelise Lesmeister, Ashley Rawhouser
U.S. Forest Service	Kari Grover-Wier, Alex Martinez, Paul Willard
U.S. Fish and Wildlife Service	Steve Lewis
Washington Department of Fish and Wildlife	Graham Simon
Washington State Parks and Recreation Commission	Tom Ernsberger, Jamie Van De Vanter
Washington Interagency Committee for Outdoor Recreation	Nona Snell
Confederated Tribes of the Colville Reservation	Bill Towey
The Yakama Nation	Bob Rose
The Confederated Tribes of the Umatilla Indian Reservation	Carl Merkle
City of Chelan	Bob Goedde, Charles Sablan, Paul Schmidt
Lake Chelan Sportsman's Association	Phil Archibald
Manson Parks and Recreation Department	Wai Petersen
Lake Chelan Recreation Association	Richard Uhlhorn, Jim Urness
American Whitewater	Tom O'Keefe

The following comments were received: